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KAM® SC SAMPLER CONTROLLER

PER API 8.2, ASTM D4177 AND ISO 3171

User Manual

SCMANUAL-0613

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MOUNTING OPTIONS

FIG. 1-1 NEMA IV ENCLOSURE

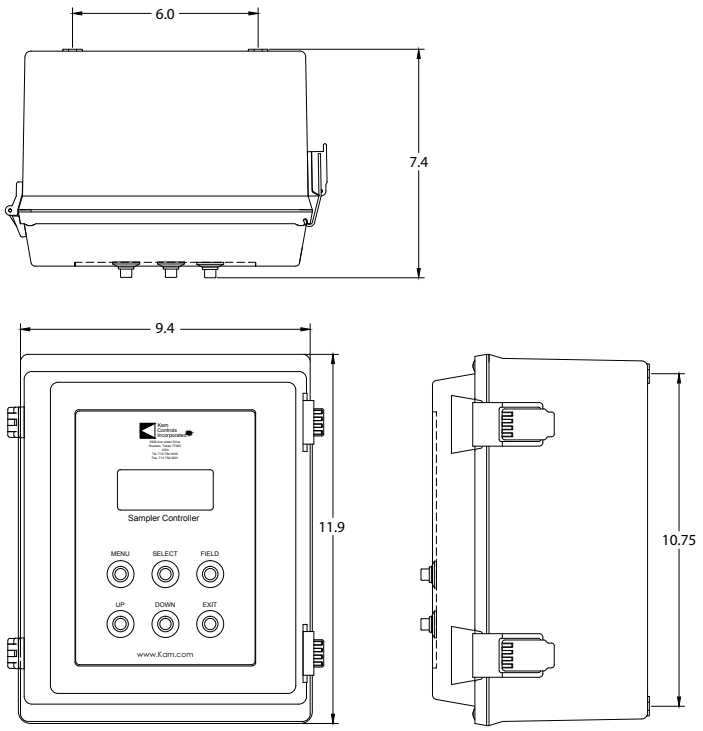
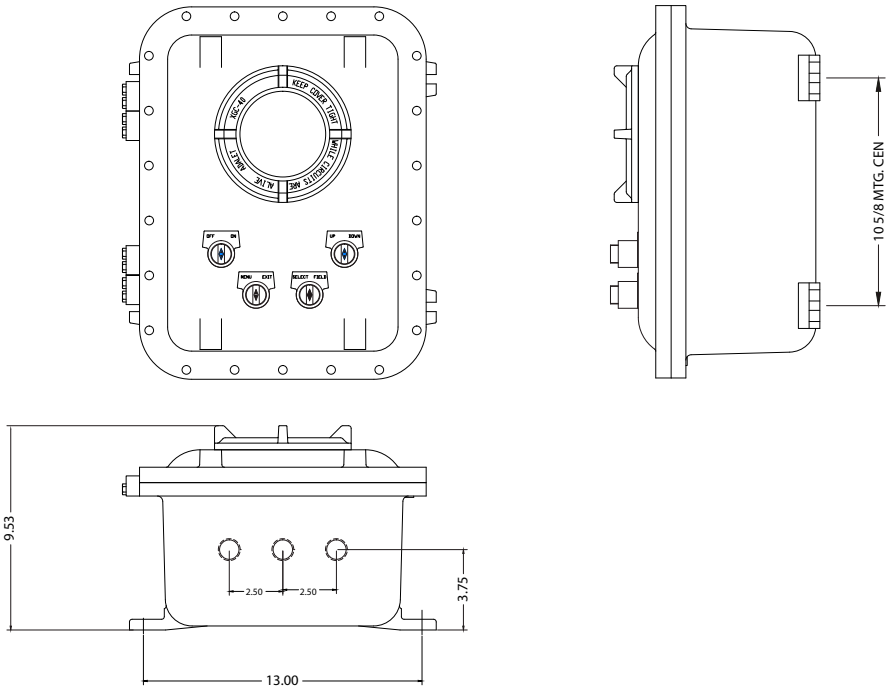


FIG. 1-2 EXPLOSION PROOF ENCLOSURE



INTRODUCTION CONTINUED

THEORY OF OPERATION

The KAM® SC™ Sampler Controller is an extremely user friendly way to regulate and monitor sample size with the KAM® IAS™ sampler. Through a localized input, operators enter values for multiple factors such as pipe size, fluid gravity, total number of sample grabs, and cargo size. This information combined with continuous data from a flow meter enables the KAM SC to calculate the flow volume required for sampling and to regulate the sampling sequence appropriately via a solenoid valve on the sampler. Additionally, the KAM SC receives data from the sampler and is able to display flow rate, total volume, pressure, temperature, total samples taken, and sampler performance.

FEATURES

- User friendly
- User programmable
- Local LCD display
- Time, day, month, & year
- Container overfill shutoff
- Automatically switch between containers

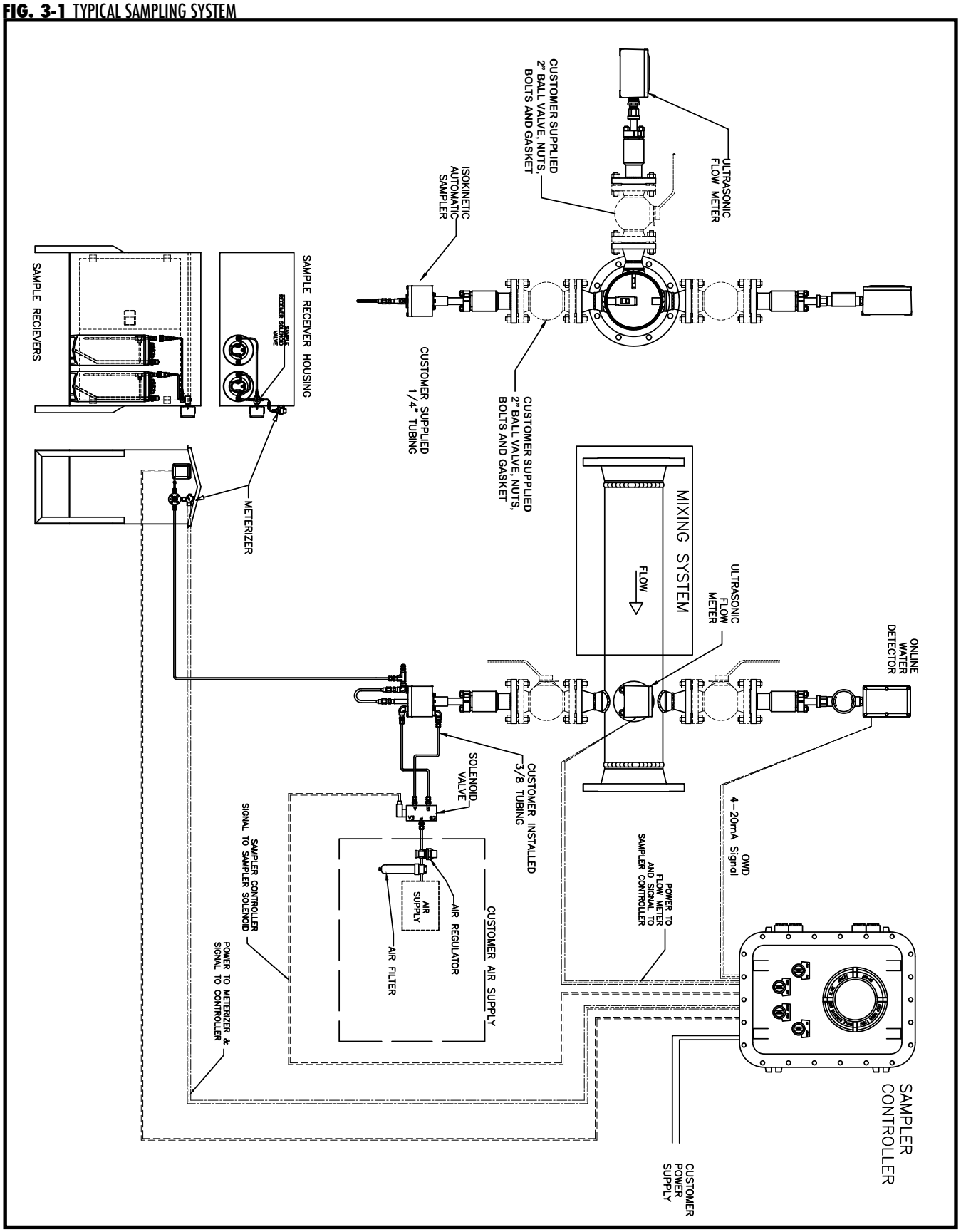
APPLICATIONS

- Marine tanker (loading, unloading, lightering)
- Blending
- Additive injection
- Pipeline
- Truck (loading, unloading)
- Production
- Refinery
- Power plant fuel oil
- Research

SPECIFICATIONS

Power Requirements:	24 VDC, 110 or 220 VAC, 50/60 Hz
Panel Mount Dim.:	7" x 5" x 1.5" (175mm x 127mm x 40mm)
Mounting:	NEMA IV – 8"(120mm) x 10" (255 mm) x 6"(150mm) Explosion Proof Enclosure –10.5 x 13"
Enclosure Weight:	NEMA IV - 15 lbs. (6.8kg) Explosion-proof - 55 lbs. (24.9kg)
Inputs:	Flow meter pulse input Meterizer pulse input Analog (2) for OWD and scale Digital (2) switch and emergency stop
Outputs:	High current (2) to solenoid valve(s)
Interface:	RS-232

FIG. 3-1 TYPICAL SAMPLING SYSTEM



INSTALLATION CONTINUED

WIRING

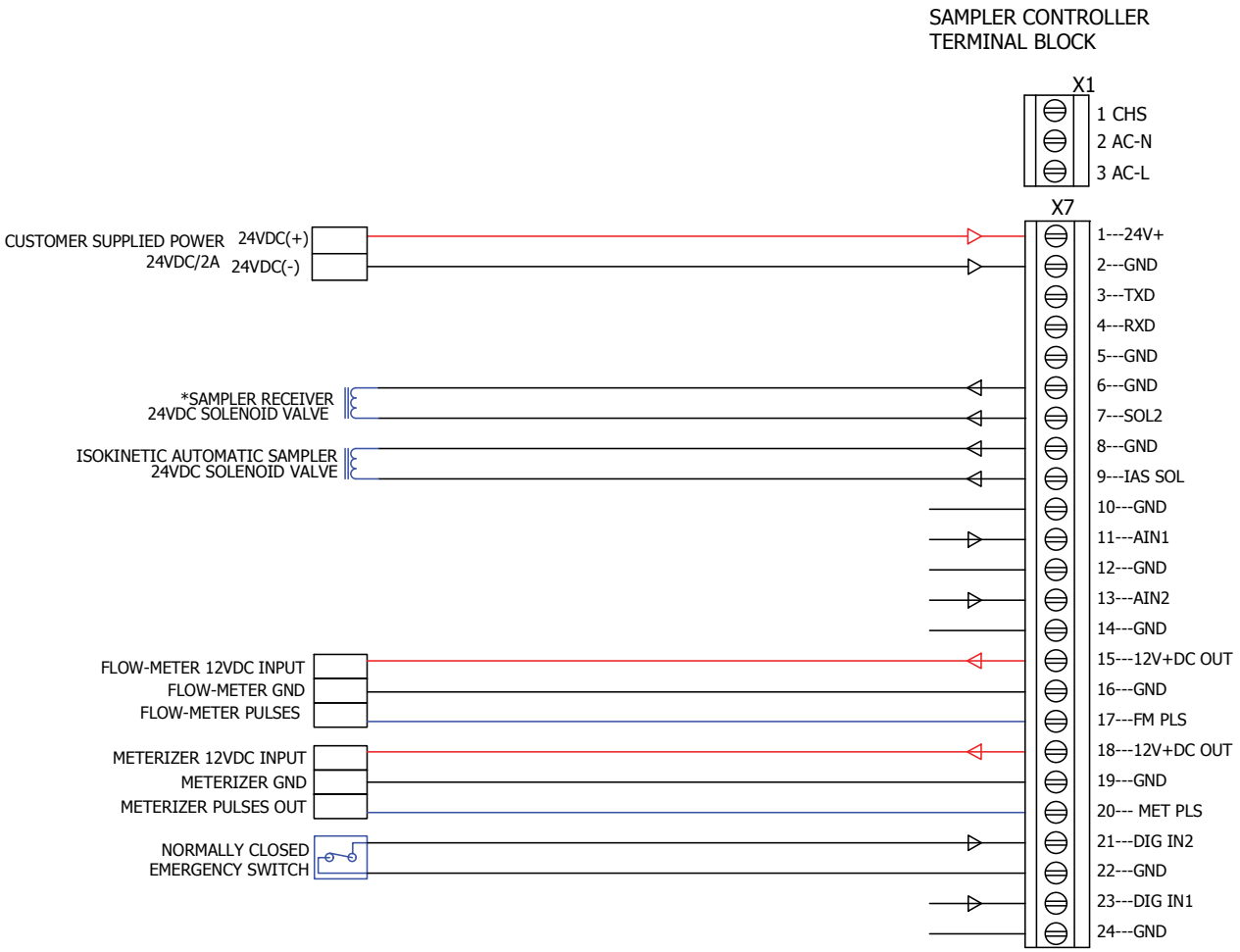
Terminal X1

1. CHS--------110AC power input ground wire
2. AC-N-------110AC power input neutral
3. AC-L -------110AC power input line

Terminal X7

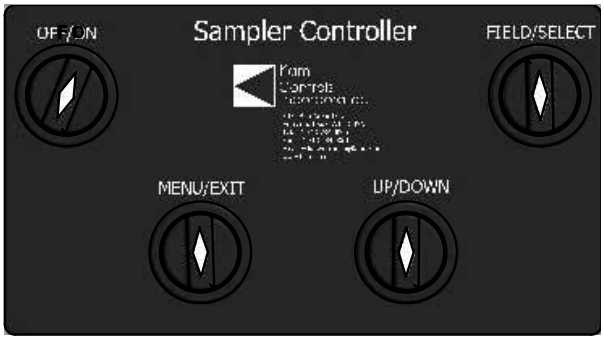
1. 24V+ ------24Vdc In for 24Vdc controller option, or 24Vdc out for 110ac controller
2. GND-------System ground
3. TXD--------RS232 TX for downloading batch information
4. RXD--------RS232 RX for downloading batch information
5. GND ------System ground
6. GND ------System ground
7. SOL 2------To control a 24V solenoid valve or relay
8. GND ------System ground
9. IAS SOL----To control a sampler solenoid or sampler relay
10. GND------System ground
11. AIN1------4-20mA analog input for OWD Oil Water Detector
12. GND------System ground
13. AIN2------4-20mA analog input for online weight scale
14. GND------System ground
15. 12V+ -----12Vdc supply for flow meter fused with an 800mA fuse
16. GND------System ground
17. FM PLS----Flow meter input 0-12Vdc pulses
18. 12V+------12Vdc supply for flow meter fused with an 800mA fuse
19. GND------System ground
20. MET PLS---Flow meter input 0-12Vdc pulses
21. DIG IN2---Digital input for level switch.
22. GND -----System ground
23. DIG IN1---Digital input for level switch
24. GND-----System ground

FIG. 3-2 TERMINAL BLOCK



USER INTERFACE

The Controller has a set of switches for user interface. The explosion-proof version has selector switches and the Nema 4X version has push-button switches.



ON/OFF Switch turns the power to the controller on or off
MENU or EXIT takes you to the main menu
FIELD moves cursor from character to character
SELECT used to enter menus and to accept settings
UP used to scroll between menus, increase numbers and to change options in the menu
DOWN used to scroll between menus, decrease numbers and to change options on the menu

MAIN MENU

START NEW BATCH: enters the menu for a new batch
PLAYBACK LOG: select to download batch information
VIEW CONFIG SET: read-only menu showing all current settings
CHANGE CONFIG: menu to view and change main settings such as number of samples, flowmeter calibration factor, number of receivers, etc.
RESET TO FACTORY: restores controller to the factory default setting

CHANGE CONFIGURATIONS MENU

1. From the main menu use the DOWN switch to navigate cursor to CHANGE CONFIG and press or turn the SELECT switch.

2. You will be prompted for a passcode. Using the FIELD, UP, and DOWN switches enter the pass code 900000.

If the code is correct you will see the configurations menu. If you have the wrong code, the display will return to the main menu. In the configurations menu, you can change the following settings by scrolling through the display and selecting each item:

- Set date and time
- Batch Mode
- Flow M-pls/b (flow meter pulses per barrel)
- API Grav
- Meterizer
- Batch Size bbls
- Total Smp (total samples)
- Samp Receiver
- Smp Dur (sec)
- Sec Betwen Smp
- Level Switch
- OWD
- Weight Scale
- Weight Scale 2
- Contrast

3. To change individual settings from the Change Configurations menu, use the UP and DOWN switches to scroll through the menu. When the cursors bracket the desired setting, push or turn SELECT to change.

When you have selected an individual setting, the prompts that follow will vary depending on the settings. Use the FIELD switch to change entry fields, the UP and DOWN switches to change values. In the case of "Set Date and Time" use the FIELD switch to move between year, date, hours, etc.

When you have entered all the values, hit SELECT. You will be asked to "Save New Settings?" Use UP and DOWN switches to toggle between Yes and No. To save your settings, make sure that the display reads "Yes" and hit SELECT. You must do this for *EVERY* setting you wish to change.

The screen will return to the Configurations menu. Select MENU or EXIT at any time to return to the main

CONFIGURATIONS SETTINGS

Batch Mode

This allows the user to automatically or manually start new batches. First, use the up/down buttons to select "Auto" or "Man." If you wish to manually start batches, select "Man" and save the setting when prompted. If you would like to automatically begin new batches, select "Auto." You will then be prompted to select "Time or Flow." If you would like to automatically start new batches based on time intervals, select "Time." You will then be asked to select "Time btw batch in hours." Use the UP/DOWN buttons to select the number of hours between batches. If you would prefer to start new batches based on flow, select "Flow."

Flow M-Pls/b:

This allows the user to configure the Sampler Controller to use the pulses from the flow meter to calculate the correct flow rate. The normal setting is 1000. That means that 1000 pulses from the flow meter count as one barrel. 500 pulses count as 0.5 barrels etc. Increasing the pulses per barrel will decrease the flow-rate calculated by the controller because it will take more pulses to count as one barrel. Decreasing the pulses per barrel will increase the flow-rate.

To recalculate the proper pulses per barrel, follow the steps below:

A. Use the MENU or EXIT switch to return to the Main Menu.
B. Start a new batch and fill in all the correct information.
C. Wait a minute to until the controller shows a steady flow rate.
D. Divide the flow rate showing on the controller by the actual flow rate going through the line (verified by tank gauging or an additional flow meter). The result is the calibration factor.
F. Exit out of the batch with the MENU or EXIT switch.
G. From the main menu, select Change Config and select Flow M-Pls/b.
H. Multiply the number showing there by your calibration factor. The result of that will be your new Pulse per Barrel Factor. Round off any decimals.
I. Use FIELD, UP, DOWN switches to enter the new Pulses per Barrel Factor.
J. Hit SELECT. At the Save New Settings? screen, make sure "Yes" is selected and hit SELECT to save changes.
K. Start a new batch to confirm that the controller shows the correct flow-rate

Calibration Example 1
Flow rate on the controller = 25,000 bbl/hr
Correct Flow rate = 22,000 bbl/hr
Current Pulses per Barrel Factor = 1000
25,000 ÷ 22,000 =1.136
1000 x 1.136 = 1136 new pulses per barrel factor

API Grav:

Allows flow meter to compensate for density change. Default is 10. Range is 10–90.

Meterizer:

If you have a Meterizer, select "Yes" when prompted. You will be asked for the "Default Meterizer Pulses Per ml." Default is 4. See your meterizer data sheet for specific number. You will also be asked for the default sample size. This is actual volume of individual samples which is manually set on the sampler probe. Default is 2.5 ml. Then you will be asked if you wish to "Continue Sampling When Samples Ordered is Reached?" If you wish to do so select yes and you will be asked if you wish to "Activate Solenoid 2 when Samples Ordered is Reached? This would be for situations with a second Sample Receiver or an alarm.

Batch Sz bbls: Batch size in barrels. Default is 500,000.

Total Smp: Default # samples over the entire batch.

This value is determined by the size of the container where the sample is going and the sample size of the sampler. Most users want to sample 80% percent of the capacity of the container. If this is the case, the formula for determining the number of samples of over the entire batch is the following:

Total Smp = (sample container size in milliliters x .8)/(sampler sample size in milliliters)

Conversion Factors
1 Gallon = 3785mL
3 Gallon = 11356mL
5 Gallon= 18927mL
Example: Container size = 5 Gallon
Sampler Sample size = 3mL
Number of Samples of Entire Batch=(18927mlx.8)/3ml=5047
Most users would round down to 5000.

Samp Receiver: Number of sample receivers (1 or 2) you have connected to system. Default is 1. If you have 2 sample receivers in use, select 2. You will then be prompted to enter the "percent of samples to activate sol 2." If you have a meterizer or weight scale, this should be set at 100.

Default Sampler Solenoid Duration: This the amount of time the solenoid on the sampler stays activated. This may be changed in situations where the sampler is unable to keep up with flow, but should not be set below 1.5 seconds. 2 seconds is the preferred setting.

Dflt Seconds btwn smp: This determines the seconds between samples for Manual Sampling Mode only. A setting of 10 sets the controller to activate the sampler solenoid every 10 seconds, a setting 60 sets the controller to activate the sampler solenoid to every minute, etc. This setting can be changed every time you start a new batch in manual mode.

Level Switch: If you have a Level Switch connected to your Sampler Controller, select "yes." You will then be prompted to "Continue Sampling if Closed?" If you have a second receiver, select yes, and then yes again when prompted to "Activate Solenoid 2 if Closed?"

OWD: If you are using an OWD Oil Water Detector to monitor water concentrations in real time, select "yes." You will then be prompted to select the equivalent water percentages for the 4-20mA range. 4 mA is usually equivalent to 0% water. The 20 mA equivalent should be determined during OWD calibration.

Weight Scale Connected: If you are using a weight scale to confirm the volume in the sample receiver, first select "yes" and then you will be prompted to enter equivalent weights for the 4-20mA range. Refer to your weight scale data sheet for these values. You will then be prompted to set the "Weight Setpoint," or point at which the receiver is full. You may select to "continue sampling after the weight setpoint" is reached in cases where you have a second sample receiver connected. You will then be asked to "Activate Solenoid 2 after Weight Setpoint." Finally, you will be asked to enter the weight of the empty Sample Receiver ("Empty Weight").

Weight Scale 2: You will be prompted to enter equivalent weights for the 4-20mA range.

START A NEW BATCH (FLOW BASED OR AUTOMATIC MODE)

1. From the Main Menu enter the Start a New Batch menu using the SELECT switch.

2. Using the UP switch select Auto and then use the SELECT switch to enter.

3. Use the UP, DOWN and FIELD switches to change the batch size and then the SELECT switch to enter the new setting.

4. If the API gravity of the fluid has changed, use the UP, DOWN, and FIELD switches to set the new API gravity. This will allow the flow meter to compensate for the change in density.

5. Use the UP switch to Select Yes and then the SELECT switch to enter the new setting.

Once you start a new batch, the controller will display the current status of the sampling operation. The first line will show the date and time on the following format Year-Month-Day Hr:Min:Sec. The Second line will show the volume counted in barrels. Line 3 will show the flow-rate. Line 4 will show Sample Ord: that represents the number of times the Sampler Controller has activated the sampler solenoid. If you have an OWD connected, you may scroll down the status menu to see the current water percentage. If you have a meterizer connected, the status menu will also display samples received.

START A NEW BATCH (TIME BASED OR MANUAL MODE)

1. From the Main Menu enter the Start a New Batch menu using the SELECT switch.

2. Using the UP switch select Manual and then use the SELECT switch to enter.

3. Use the UP, DOWN and FIELD switches to change the batch size and then the SELECT switch to enter the new setting.

4. Use the UP, DOWN and FIELD switches to change the number of seconds between samples and then the SELECT switch to enter the new setting.

5. Use the UP switch to select Yes and then the SELECT switch to enter the new setting.

EMO DETECTED

This screen indicates that an Emergency Manual Override has stopped sampling.